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560-703.1

FINAL MAXIMUM MISSION (SMM)

FINAL REPORT

April 1, 1985 through December 31, 1990

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History

The Solar Maximum Mission-A (SMM-A) was launched on February 14, 1980 on a Delta launch-vehicle from the Kennedy Space Center to investigate solar flares, flare-related phenomena, and total irradiance of the sun, during a period of maximum solar activity.

The Solar Maximum Mission was named and scheduled to coincide with the peak period of activity in the current solar cycle. In repeating 11 year cycles, the frequency of sunspots and related energetic solar events rise to a maximum and then begin to wane. The Solar Maximum Mission occurred during the second most active period since sunspots were first recorded centuries ago.

Unfortunately, on November 23, 1980 just 9.5 months after launch, the spacecraft suffered a crippling loss of its attitude control system and was unable to point with fine precision at the sun (Figure 1). Although a few instruments continued to send valuable data, most of the instruments were useless and those still operating lost the benefits of partnership in the coordinated observing program.

Fortunately, Solar Max was the first of a new breed of satellites built of standardized components and designed to be retrieved and repaired in space by a Space Shuttle crew.

On April 12, 1984, 4 years and 2 months after launch and 3 years and 4.5 and one half months after the control system failure, the spacecraft was repaired by a Shuttle Challenger crew and put back into operation.

Due to an increase in solar activity which caused a premature loss of orbit altitude, the SMM spacecraft re-entered the atmosphere on December 2, 1989.

During the 1990 calendar year the emphasis by the experimenter community was put into reprocessing and archiving. A headquarter's requirement was to complete any and all reprocessing by December 31, 1990. That was accomplished and therefore concluded the processing support requirement for the Information Processing Division (IPD) for the Solar Maximum Mission.

Starting in April 1985, the IPD required the contractor to provide an annual report of its yearly mission activities. A summary of those reports have been included in this Solar Maximum Mission Final Report.

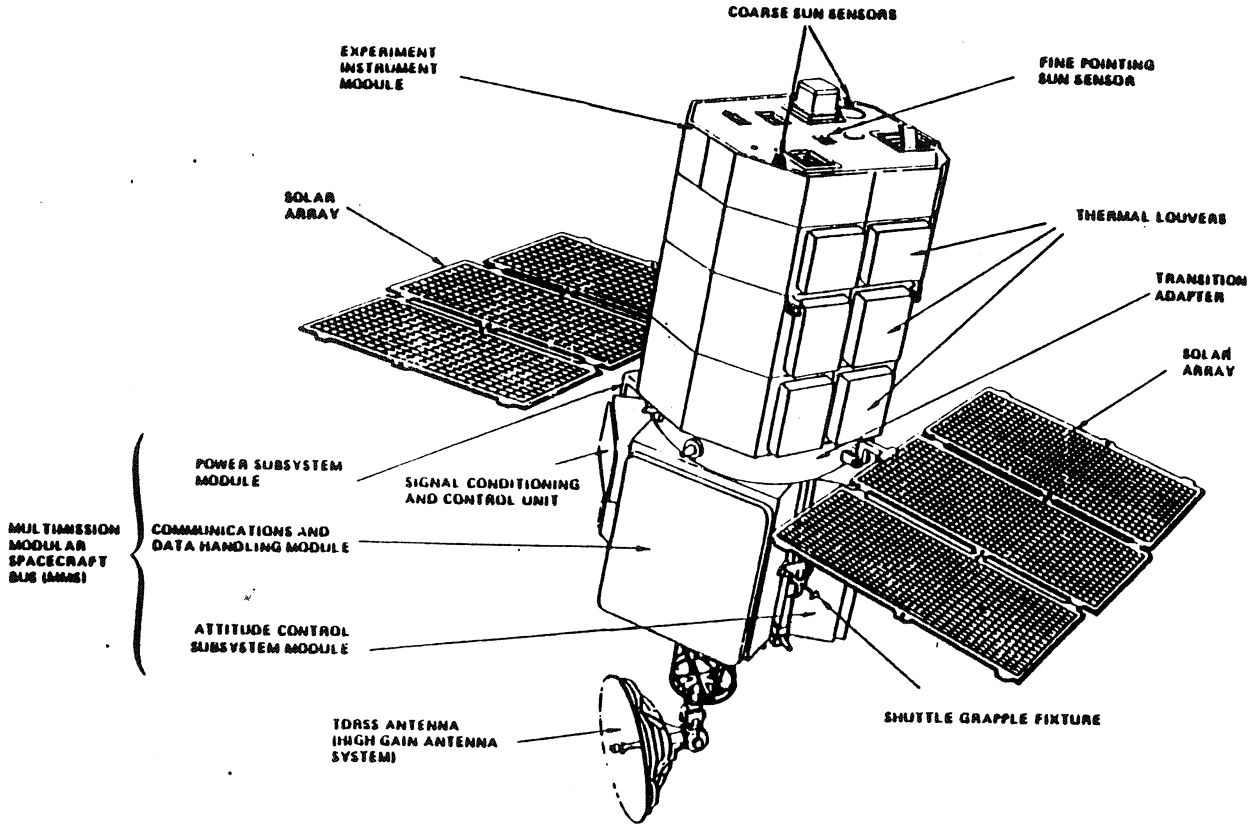

Figure 1. Spacecraft Configuration

Mission Objectives

Specific mission objectives of the Solar Maximum Mission-A are as follows:

a. Determine the fundamental characteristics of the solar plasma before, during, and after solar flares.

b. Study coronal evolution at solar maximum.

c. Determine the temperature density structure of high-energy flare plasma as a function of space and time.

d. Investigate the position, structure, and thermodynamic properties of hot-thermal and nonthermal sources in flares.

e. Determine the spectral and temporal history of proton acceleration in flares from gamma-ray lines.

g. Measure the total irradiance of the Sun.

Scientific Experiments/Principal Investigators

The following table shows the number and types of experiments that are on board the spacecraft, the Principal Investigators (PI) associated with each experiment, and the investigator's affiliation. Figure 2 shows the experiment placement aboard the spacecraft.

Table 1

Acronym	Instrument	Principal Investigator/Affiliation
ACRIM	Active Cavity Radiometer Irradiance Monitor	Dr. Richard C. Willson Jet Propulsion Laboratory Pasadena, California
C-P	Coronagraph/Polarimeter	Dr. A. Hundhausen High Altitude Observatory Boulder, Colorado
GRS	Gamma Ray Spectrometer	Dr. Edward L. Chupp University of New Hampshire Durham, Hew Hampshire
HXRBS	Hard X-Ray Burst Spectrometer	Mr. Kenneth Frost NASA/GSFC Greenbelt, Maryland
HXIS	Hard X-Ray Imaging Spectrometer at Utrecht	Prof. C. DeJager The Astronomical Institute The Netherlands
UVSP	Ultraviolet Spectrometer and Polarimeter	Dr. Einor Tandberg-Hanssen NASA/MSFC Huntsville, Alabama
XRP	X-Ray Polychromator	Dr. Loren W. Acton Lockheed Palo Alto Research Laboratory Palo Alto, California
XRP	X-Ray Polychromator	Dr. J. Leonard Culhane Mullard Space Science Laboratory United Kingdom
XRP	X-Ray Polychromator	Dr. Alan H. Gabriel Rutherford & Appleton Laboratory United Kingdom

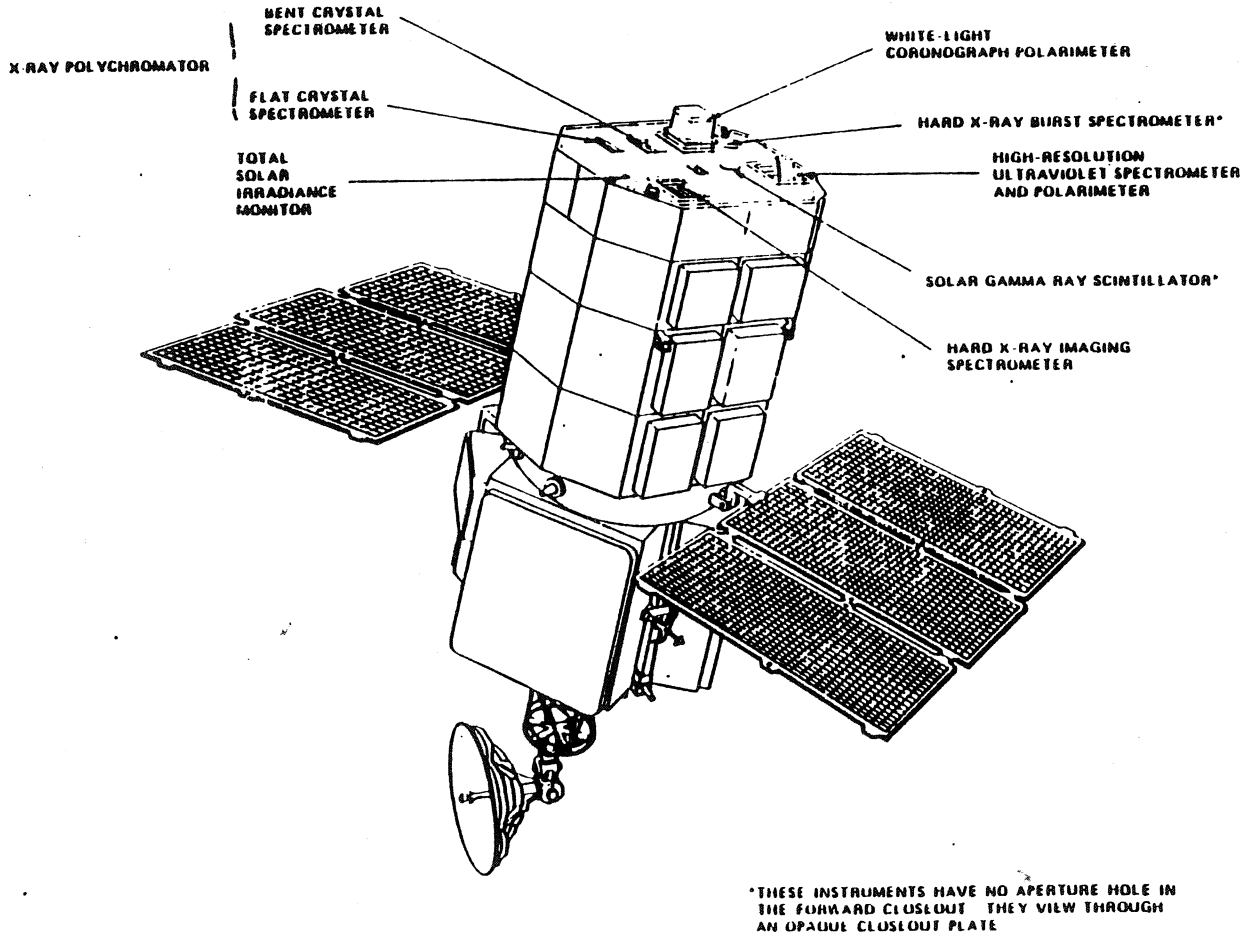

Figure 2. Experiment Placement Aboard Spacecraft

Data users

The following are the names and addresses of the Users that receive SMM data:

X-02
Dr. Richard A. Shine
Code 602.6, Room 258C, Bldg. 7
NASA/GSFC

X-03A
Dr. Arthur Hundhausen
High Altitude Observatory
National Center for Atmospheric Research
Boulder, Colorado

X-04A
Mr. D. T. Reothig
Dept. 91-20, Bldg, 255
Lockheed Palo Alto Research Laboratory
3251 Hanover Street
Palo Alto, California

X-04B
Mrs. J. Gilling
Space/Astro Division, Room 1, Bldg. R25
Rutherford Appleton Laboratory
Chilion, Didcot
Oxon OXII OQX
England

X-04C
Paul McLaughlin
University College London
Mullard Space Science Laboratory
Holmbury, St. Mary
Dorking, Surrey
United Kingdom

X04D
Sam Freeland
XRP EOF Area Bldg. 7, Room 258E
NASA/GSFC

X-05A
Dr. E. L. Chupp
Physics Department
Demerett Hall
University of New Hampshire
Durham, New Hampshire

X005B
Dr. Eric Reiger
Max Planck Institute for Extra
Terrestrial Physics
8046 Garching-B, Muenchen
West Germany FRD

X-05C
Dr. Gerald Share
Naval Research Laboratory
Code 1310
4555 Overlook Ave., Southwest
Washington, D.C. 20375

Data Users (Continued)

X-06 Dr. Larry Orwig
Code 602.6, Building 7, Room 258D
NASA/GSFC

X-07 Dr. R. Willson
Jet Propulsion Laboratory
MS171-400
4800 Oak Grove Drive
Pasadena, California

Production Systems Utilized

System	Equipment	Use
TIPIT	SEL32	Data Acquisition
TELOPS	IBM370	Data Acquisition Pre-Editing Mass Storage
DCS	Varion 620I	Backup Data Acquisition for STDN
1100/82	Sperry	EDIT and Decommutate Time Correction

Production Processing Requirements

Production processing consists of processing all playback data to produce a complete and chronological data base for the final scientific analysis. The playback data will be reversed and edited into major telemetry frames. Telemetry format changes will be detected and identified for later decommutation processing. Time annotation to an accuracy of ±10 milliseconds or better will be decommutated to produce experimenter data tapes compatible with the computer facilities of the experimenters.

The experimenter data tapes will contain the following information:

a. Experiment minor frame data.

b. Experiment subcommutator data.

c. Spacecraft minor frame data.

d. Spacecraft subcommutator data.

e. Flag fields indicating fill or noisy data.

f. GMT annotation of data to an accuracy of ±10 milliseconds or better.

Project Data Formats

The Project Data Formats (PDF) for SMM-A are as follows:

a. PDF-A is designed to contain real-time 16 kb/sec data in a forward direction.

b. PDF-B handles the 32 kb/sec Onboard Computer (OBC) data dump, and is sent simultaneously with Format A in a forward direction to GSFC.

c. PDF-C handles High Altitude Observatory (HAO) real-time data at 256 kb/sec, as a backup mode of operation in the event that the HAO recorder becomes inoperative. These data will be input to the Digital Data Processing System (DDPS) at 128 kb/sec and transmitted to GSFC in the forward direction.

d. PDF-D contains spacecraft recorder dump data at 512 kb/sec (these data will be analog recorded and input to the DDPS at 128 kb/sec, and transmitted to GSFC in reverse order).

e. PDF-E contains HAO recorder dump data at 512 kb/sec (these data will be analog recorded and input to the DDPS at 128 kb/sec, and transmitted in reverse order).

f. PDF-F contains spacecraft recorder dump data, with the same characteristics as PDF-D except the transfer to DDPS is at 256 kb/sec.

g. PDF-G HAO recorder dump data have the same characteristics as PDF-E except the transfer to DDPS is at 256 kb/sec.

h. PDF-H will contain spacecraft recorder dump data at 512 kb/sec (data will be analog recorded and played back in reverse order at 12:1 reduced speed from the recorder). The playback data rate of the analog tape will be 42.666 kb/sec.

i. PDF-I contains HAO recorder dump data at 512 kb/sec (data will be analog recorded and played back in reverse order at 12:1 reduced speed from the recorder; the playback data rate of the analog tape will be 42.666 kb/sec).

j. PDF-J contains spacecraft recorder dump data at 512 kb/sec (data will be analog recorded and played back in reverse order at 6:1 reduced speed from the recorder). The playback data rate of the analog tape will be 85.333 kb/sec.

Project Data Formats (Continued)

k. PDF-K contains HAO recorder dump data at 512 kb/sec (data will be analog recorded and played back in reverse order at 6:1 reduced speed from the recorder). The playback data rate of the analog tape will be 85.333 kb/sec.

l. PDF-L will be real-time data at 1 kb/sec. This is an emergency format and will be used to sync the OBC dump in the event it gets out of main frame sync with the real-time 16 kb/sec data (data will be in a forward direction and should be transmitted off station at 1 block per second).

Note

PDF's C, D, and E can be direct from an analog tape or from digital tapes.

Production Data Flow

Upon receipt of the SMM telemetry data, the STDN or TDRSS ground stations will digitize the data, format the data into Nascom message blocks, and transmit the data to the IPD via Nascom communication lines. The overall data flow for SMM-A Production processing is shown in Figure 3.

SMM DATA FLOW FOR PRODUCTION AND QUICK-LOOK PROCESSING

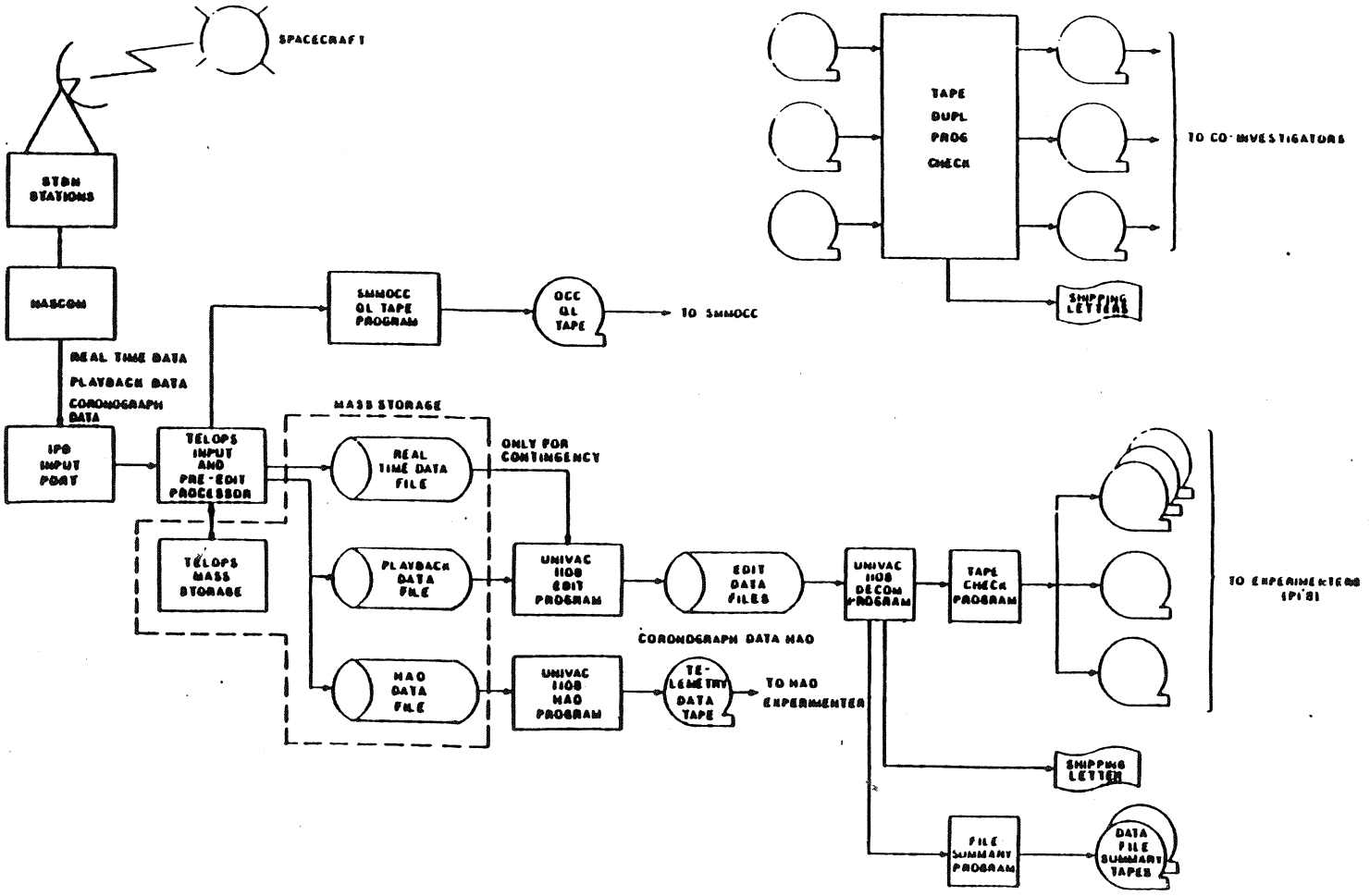

Figure 3. SMM Data Flow for Production and Quick-look Processing

Production Goals/Timelines

a. The goal or timeline for shipment of data to the Users is 4 weeks from IPD receipt, as stated in the Mission Contract Quarterly Forecast (Table 2).

b. Data transmissions to the EOF will nominally be made within 4 to 6 hours after receipt at IPD. Data older than 5 days will not be transmitted.

Table 2. Mission Contract Quarterly Forecast

Project/Product	Unit of Measure	Goals: Timeline	Goals: Weekly Average Processing Rate	Comment
ISEE-1				
PCM	Days	5 weeks from IPD receipt	7/wk	
DPL	Days	6 weeks from IPD receipt	7/wk	
MCE	Days	6 weeks from IPD receipt	7/wk	
Film	Set (5wk)	2 weeks from completion of last master edit in set		
ISEE-2				
PCM	Days	5 weeks from IPD receipt	7/wk	
MCE	Days	6 weeks from IPD receipt	7/wk	
ICE				
PCM	Days	35 days from the first day of the 7-day group	7/wk	
DPL	Days	6 weeks from IPD receipt	7/wk	
Film	(Set 5wk)	2 weeks from completion of last master edit in set		
IMP-8				
PCM	Days	8 weeks from IPD receipt	7/wk	
MCE	Days	8 weeks from IPD receipt	14/2wk	
SMM				
PCM and HAO	Days	4 weeks from IPD receipt	7/wk	
ERBS				
ERBE	Days	4 weeks from IPD receipt	7/wk	
SAGE II	Days	4 weeks from IPD receipt	7/wk	
Quicklook	RT/PB	24 to 48 hours from IPD receipt		As requested
SMS(GOES/VISSR)				
PCM	Scenes		60/wk	If requested
/0mm film	Images		120/wk	If requested

Amount of Data Received

	4/1985-3/1986	4/1986-3/1987	4/1987-3/1988	4/1988-3/1989	4/1989-3/1990	4/1990-12/1990
Number of Data Files Received	9885	8402	7647	7466	4351	-
Number of Data Files Released	9358	7983	7845	7293	4236	-
Number of Re-transmissions Requested	959	813	354	295	179	-
Number of Re-transmissions Received	972	813	354	295	179	-
Number of EOF transmissions Sent	1407	706	1346	2792	1946	-

Tape Products Generated/Shipped

	4/1985-3/1986	4/1986-3/1987	4/1987-3/1988	4/1988-3/1989	4/1989-3/1990	4/1990-12/1990
	7504	6772	5542	5018	3082	297
Cost to Ship	$107,157	$ 99,481	$ 81,412	$ 90,049	$ 55,322	$ 5,331
Special Requests Generated (Quicklooks, Supernova Production Etc.)						
	46	146	817	780	155	140
Change Request (CR)/Discrepancy Report (DR) and User Response (UR) Activity						
CCR's opened/ closed	1	14	8	4	1	-
DR's opened/ closed	35	10	39	13	-	-
UR's opened/ closed	1	26	37	59	40	19

Interorganization Transmitted (IT) Activity

	4/1985-3/1986	4/1986-3/1987	4/1987-3/1988	4/1988-3/1989	4/1989-3/1990	4/1990-12/1990
	44	72	29	20	17	11
Total Man Hours Expended to Complete ITs	329.6	996.5	288.9	303.5	125.0	27.1

Highlights April 1, 1990 - December 31, 1990

During the period of April 1, 1990 through December 31, 1990, archiving and reprocessing activities were the only highlights that occurred. These are summarized under tape Products Generated/Shipped. Since all reprocessing requests were completed for the user community, a total of 11,004 tapes associated with the mission that were being stored at the Tape Staging and Storage Facility (TSSF) have been released for reuse.

Since all activity and reprocessing have been completed, this will be the final SMM report to be issued.

Highlights April 1989 - March 1990

The single most significant event to happen during this reporting period for the Solar Maximum Spacecraft and the Solar Maximum Project, was its loss of control and subsequent re-entry.

The U.S. Space Command (Formerly NORAD) reported that at 5:26 a.m.-EST, Saturday, December 2, 1989, the spacecraft entered the atmosphere and splashed down in the Indian Ocean.

Goddard operations for the Solar Maximum Mission ended on Friday, November 24, after Flight Controller jettisoned the spacecraft solar panels. This final engineering test performed on the decending spacecraft rendered the SMM powerless and marked the end of 9.5 years of Solar science from this observatory.

The last transmitted data received from the spacecraft was processed and shipped by the Information Processing Division (IPD), Code 562, during the week ending December 1, 1989.

On July 18, 1989, the SMM Mission Manager and NASA's Code 562 Data Processing Manager attended an Investigator Working Group meeting at the National Center for Atmospheric Research in Boulder, Colorado.

These meetings are held three times per year: two at Goddard Space Flight Center (GSFC), and one at a remote investigator site. The purpose of these meetings is to bring all the PI's and all SMM support groups together to discuss what science goals have been achieved, what the new science goals are, and discuss funding and spacecraft instrument status.

Some of the topics that were discussed are as follows:

Spacecraft status and expected loss of control and re-entry dates.

Engineering tests to be performed just prior to loss of control, such as battery and solar panel testing.

Headquarters wanted the PI's to put some kind of a symposium together covering the accomplishments of SMM in the past decade, no date was set for this.

Headquarters stated that Data Archiving is the most important activity that the experimentor and the project have to do. Headquarters asked that all archiving efforts be completed no later than December 1990. This would require IPD to keep available processing capability and tape storage services until the end of 1990.

Highlights April 1989 - March 1990 (cont)

In February 1990 the Attitude Analysis Section (Code 554.1) requested that IPD provide Telemetry Data processing of SMM data for the time period of September 1, 1989 to the end of the mission. This request was completed 1 month ahead of schedule. A letter of appreciation was received from Code 554.1 for delivering the data in a timely manner.

As an item of interest, it was noted that as part of the archiving effort, some of the experimenter groups were copying IPD 9-track tapes onto 8mm video tape cartridges. They can put 45 IPD tapes onto one 8mm cartridge and the whole 10-year mission onto 80 cartridges. This is being done as a temporary measure because they fear that they will be unable to read IPD tapes in the future due to the age of the tapes. Eventually, this data will be put onto optical disk.

Highlights April 1988 - March 1989 (cont)

All Production Goals were met or exceeded during this reporting period.

The BFEC Mission Manager and the NASA DPM attended an Investigation Working Group meeting in Palo Alto California in May of 1988. The major topic of conversion involved around the possibilities of either a retrieval or a repair mission. On December 8, 1988, a decision was made by Mr. L.A. Fisk of Code E to do neither and allow SMM to reenter.

Under normal conditions reentry would not occur until approximately late 1990 or early 1991. But due to an increase in solar activity in the past year, loss of SMM will occur between mid July and late August of 1988, and reentry would occur 6 to 10 weeks later.

In September 1988, SMM was part of a campaign titled "International Solar Month". The campaign coordinated solar observing from instruments around the world. More specifically it was a joint venture between NASA and IKI, the Soviet Space Agency. Simultaneous solar observations were made by SMM and the Soviet Spacecraft Phobos that was enroute to Mars. IPD provided expedited processing for the X-ray Polychromator experiment team for a period of approximately 30 days. IPD also coordinated the release of recorded data at the tracking sites, so no data would be lost until verified by the experimenter.

In order to reduce the number of Supernova quick-look tapes per day that were being shipped to the University of New Hampshire, the University agreed to allow IPD to hold up processing for 24 hours to allow all the data for a particular day to be captured in Telemetry Online Processing System (TELOPS). In the past, as many as 40 tapes per week have been shipped. This new measure reduced the shipment to 7 to 10 tapes per week.

Bendix personnel investigated a problem reported by an experimenter that data gaps were occurring in real-time data that IPD produced and shipped. After a lengthy investigation, it was discovered that the SMM Decom program on the Sperry 1100/82 computer was incorrectly flagging PDF-Q real-time data as playback data. A software fix was made to correct the problem.

The recommended solution or workaround to the problem for the data that already exists, is to ignore the incorrect flag. Reprocessing of the data is not necessary since the data is already there. As of this report, a memo to the experimenter from NASA is being prepared, explaining the problem and the recommended solution.

At the request of the experimenter (Dr. Ed Chupp of the University of New Hampshire), quick-look processing support for Supernova 1987-A was suspended.

Highlights April 1987 - March 1988 (cont)

All Production Goals were met or exceeded during this reporting period.

The Experimenter Operations Facility (EOF) reported not receiving data from IPD for a 24-hour period on February 12, 1988. The problem was traced to a bad Synchronizing and Formatting Unit (SAFU) on the TDRSS Interface Preprocessor Into Telops (TIPIT) system.

A letter of thanks was received from Dr. E.L. Chupp, the Department Head of Physics at the University of New Hampshire, for IPD's continuing quick-look support for Supernova.

A new version of the HAO/AQ/DECOM program was received from NASA Code 563. This new version contains fixes to five DR's that were written during the Acceptance Test (AT). All Discrepancy Reports (DR) were build-related and did not affect the outgoing data.

During an experimenters meeting held on August 17, IPD was asked to explain how SMM data are timed-tagged and why there was a 65.5 ms difference between Control Center and IPD time tagging. After several meetings with the experimenter, Control Center personnel (OAO Corp.), and IPD, it was revealed that the Control Center was using the end of the minor frame instead of the beginning to identify time for each minor frame. The Control Center and IPD will now use the same method.

At the request of the experimenter, weekend overtime for Supernova support was suspended.

The Lockheed Mission Manager and the NASA DPM attended SMM Investigator's Working Group meeting on May 13. There is a proposal pending at NASA Headquarters for another SMM repair mission. It would include an Infrared (IR) telescope, some additional new experimenters, repair of old experimenters, three new tape recorders, repair of the TDRSS antenna, and movable solar panels. If approved, the repair would occur between January and August 1989 and cost approximately $25 million.

A tape drive incompatibility problem between IPD and the EOF was identified and resolved. The project office and the experimenter agreed that the problem is the experimenter's tape drive and it will be replaced as soon as possible.

Highlights April 1986 - March 1987

- A memo from the SMM Project Office was received, requesting that the timeline or transmitting data to the EOF be extended from 24 hours to 5 days. The Mission Manager with CCB approval, updated and delivered the Interface Agreement Document between IPD and the EOF, to the appropriate areas.

- The Mission Management Office together with members of the Data Analysis Department arranged meetings with the Flight Dynamics Division (Code 550) to discuss problems that had been experienced in receiving orbit data for SMM. These meetings lead to not only resolving the timeliness in which data was received but lead to a better understanding by each organization of what the other does. New lines of communication were set up to expedite problems resolution.

- A software change request (CR 1841) was installed and implemented allowing all but one SMM experimenter group to receive 6250 bpi Decom tapes. Installation of this CR has eliminated 800 bpi products.

- The SMM Mission Manager coordinated an investigation of a complaint made by the Jet Propulsion Laboratory (JPL) investigator that he could not read the new 6250 bpi tapes that were sent to him. The investigation concluded that the investigator was using incompatible Fortran software when he switched to new hardware at the same time the new 6250 bpi tapes arrived. The investigator made the necessary changes to be compatible.

- The SMM Mission Manager received a memo of commendation from the Director of the High Altitude Observatory for the contributions made in making the Halley's Comet quicklooks a success.

- The SMM Mission Manager along with NASA DPM attended an Investigators Working Group (IWG) meeting at the High Altitude Observatory in Boulder, Colorado, the week of September 8, 1986. Some of the items discussed were:

  - Plans for retrieving SMM and putting on new experiments appeared to be a bit sketchy. It seems more probable that another repair mission may be planned to add some new instruments, repair existing ones, as well as, repairing the TDRSS antenna.

Highlights April 1986 - March 1987 (cont)

- The principal investigators are planning a campaign to advertise to congress what benefits the SMM program has produced. This is being done to help ensure continued funding in the future.

- A joint U.S.-Soviet Union collaboration using SMM is being discussed. The Soviets will be launching a Mars probe in 1988. During the trip to Mars which will take approximately 200 days they would like to make solar observations and compare their data to data taken by SMM. Between now and then the SMM experimenters will try to cut through all the bureaucratic paper work that is necessary in this type of venture.

- The HAO experimenter expressed his pleasure with the timeliness in which he was receiving data. He was receiving data 10 days after spacecraft acquisition which allows him an almost real-time look at his data and eliminates a backlog of data to be analyzed.

o On July 9, 1986, a Solar Maximum Mission user identified time discrepancies occurring between data tapes in four instances. Lockheed analyzed the problem and discovered a common link: an "06 card," providing day, Universal Time Code (UTC), and spacecraft (S/C) clock time, was used to compute the UTC associated with each data point instead of using curve-fitted coefficients based on real-time data. Lockheed identified 137 data days from 1984, 1985, and 1986 which had been processed using 06 cards. Of these 137, 97 were reprocessed quickly using a new utility, 27, required special handling due to spacecraft clock anomalies or rollovers, and 13 were uncorrectable. The decision was made to re-create the "EDIT" tapes using the curve-fitted coefficients. Lockheed then wrote a standalone utility on the Sperry 1100/82 to read the originally generated EDIT tape, modify the UTC, and output a new EDIT tape. The delta between the original and new UTC for the first and last time point of each day was given to the users. Seven experimenters requested that this data be replaced. The reprocessing task was completed in April, 1987.

o On December 7, 1986 the SMM Spacecraft suffered a loss of its second tape recorder, leaving only one recorder operational. With the loss of Tape Recorder C, Coronagraph/Polarimeter picture data for HAO are no longer being taken. The plan is to merge HAO data into the science data stream on Tape Recorder A. Software modifications were developed by NASA Code 563 to extract the HAO data from the science data stream so that the final products would look the same as it was prior to the tape recorder malfunction. HAO data processing resumed in April 1987.

Highlights April 1986 - March 1987 (cont)

- During the months of December 1986 through March 1987 the SMM Spacecraft was used to make observations of a Black Hole named GYGNUS X-1. IPD provided quick-look processing for this event.

- In February 1987 the SMM Spacecraft was tasked to observe Supernova 1987-A.

  An IPD/Lockheed Supernova team was established to handle the large volume of quick-look processing requests that were and continue to be made by the University of New Hampshire. Approximately one-half of the daily SMM acquisitions are being processed and shipped within 24 hours of receipt at IPD.

  Special weekend overtime support has been arranged, as well as non-standard handling and shipping procedures to accommodate the rapid need for data by the user.

FUTURE

There is a proposal pending at NASA Headquarters for another SMM Repair Mission. It would include an IR Telescope, some additional new experiments, repair of old experiments, three new tape recorders, repair of the TDRSS antenna, and movable solar panels. If approved, the repair would occur between January and August 1989 and cost approximately $25 million.

Highlights April 1986 - March 1987 (cont)

- The SMM Spacecraft was inoperable for a period of 8 days in November and December due to a tape recorder malfunction, putting it into a safehold condition. All experimenters were turned off and no data was taken during this period. The IPD was notified of what data could be and could not be processed. Normal operations were resumed on 12/3/85.

- The SMM Mission Manager made a presentation at a SMM User Scientist meeting of how data are received and processed at IPD and what problems are encountered.

- The SMM and DSN Mission Managers were instrumental in coordinating an investigation of a complaint made by the SMM X-Ray Polychromator (XRP) experimenter, that he was receiving data from IPD that was believed to contain data gaps. Analysis of the data provided by the experimenter to the Mission Manager led to meetings being arranged between the IPD, the experimenter and the SMM Project Manager. These discussions led to utility software being written to aid in the analysis of the problem. The investigation concluded that there were no gaps in the data that was provided to the experimenter. A meeting with the experimenter was arranged to inform him of this and to discuss if there is any further assistance that IPD could provide. It was later discovered by the experimenter that his software had the problem and in some cases was rejecting blocks of data.

- The SMM/HAO Experimenter Operations Facility (EOF) in Building 7 contacted the SMM Mission Manager the afternoon of Friday, January 3, 1986 and stated that they had an emergency situation that required IPD support. They were in the middle of a test for the support of Halley's Comet when their ground support hardware malfunctioned and became inoperable. They needed IPD to acquire this data, process it and have it to the experimenter in Boulder, Colorado by the next day.

  Through cooperative and expeditious efforts of the DAGD, PADG and the TSSC, the data was captured, processed and shipped 3 hours after the initial phone call and 1.5 hours after the data was captured.

- After experiencing a memory failure of the OBC the week of 1/10/86, the SMM Spacecraft was reprogrammed and put back into operation the week of 1/27/86, allowing quick-look observations to be taken of the Comet Halley.

Highlights April 1986 - March 1987 (cont)

- Lockheed Center Operations successfully captured, processed and shipped to the High Altitude Observatory experimenter in Boulder, Colorado, 18 Halley's Comet quick-look observations. These quick-looks were processed and delivered in less than the 5-day turnaround that was required.

- The SMM Spacecraft experienced a malfunction of its high gain antenna the weekend of 2/15/86. An attempt to activate the backup system on 2/26/86 was unsuccessful. SMM data will now be transmitted using the GSTDN and DSN sites.

- Several experimenters requested that the density of their data tapes be changed from 800 and 1600 bpi to 6250 bpi. A software CR (1841) was initiated and installed to accomplish this.

- A change was implemented to the timeline for transmitting data from IPD to the EOF. The previous requirements stated that "data older than 24 hours from the time of acquisition will not be transmitted to the EOF", this was changed to "data older than 5 days will not be transmitted to the EOF". The Mission Manager submitted a document change to the Configuration Control Board, to update the interface agreement document between IPD and the EOF. The Mission Manager with the concurrence of the NASA DPE, prepared and presented this change to the CCB.

- Two negative events occurred during this reporting period, both occurrences were for shipping data to Users late. Procedures have been implemented to flag data that is approaching becoming late.

Glossary

Term	Definition
AT	acceptance test
DAGD	Data Acquisition General Department
DCS	Data Capture System
EOF	Experiment Operations Facility
GSFC	Goddard Space Flight Center
GSTDN	Ground Spaceflight Tracking and Data Network
HAO	High Altitude Observatory
IPD	Information Processing Division
IR	infrared
JPL	Jet Propulsion Laboratory
OBC	on-board computer
PAGD	Production and Analysis General Department
PCM	Pulse-code Modulation
PI	Principal Investigator
SAFU	synchronizing and formatting unit
SMM	Solar Maximum Mission/Solar Max
TELOPS	Telemetry Online Processing System
TIPIT	TDRSS Interface Preprocessor Into Telops
TSSC	Tape Staging and Storage Center

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ORGANIZATION	NAME	COPIES
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DISTRIBUTION	9
STORAGE	1
TOTAL	10

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